UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,954	10/22/2001	Gurtej Sandhu	M4065.0353/P353-A	8784

24998 7590 02/27/2003

DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L STREET NW
WASHINGTON, DC 20037-1526

EXAMINER
MOORE, KARLA A

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 02/27/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

mk-7

Office Action Summary	Application N .	Applicant(s)	
	09/982,954	SANDHU ET AL.	
	Examin r	Art Unit	
	Karla Moore	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17,46 and 47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17,46 and 47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *6* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 6-8 and 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,319,553 to McInerney et al. in view of U.S. Patent No. 5,935,334 to Fong et al.

3. McInerney et al. disclose the invention substantially as claimed, including: a multi chamber deposition apparatus (Figure 10) for processes such as atomic layer doping, where simultaneous processing of wafers in separate regions is desired (column 3, row 9). The apparatus comprises a plurality of regions (column 3, row 29; Figure 10, 112, 114, 116, and 118) and a centrally located loading assembly (Figure 3, 104; column 4, row 21) for moving substrates from one region to another. The plurality of regions can be separated into two pairs of regions, so that, in each pair of regions a first region (112 or 116) is capable of applying a first gas species and a second region (114 or 118) is capable of a second processing step (column 5, row 14). All regions are adjacent and chemically isolated form one another by an inert gas curtain of argon (Figure 1, 210; column 8, row 37).

4. Similar to the claimed invention, the loading assembly is capable of moving a plurality of substrates through all four regions sequentially or in a predefined pattern (column 5, row 5). Thus, a plurality of substrates can be treated simultaneously in respective pairs of first and second regions and then transferred to another plurality of regions.

5. However, McInerney et al. fail to teach a first atomic layer region used for deposition and a second atomic layer region used for thermal diffusion of the dopant species.

6. Fong et al. teach deposition of a dopant species in a first processing region and transfer to a second processing region, such as an annealing chamber or a rapid thermal process reactor, for the purpose of driving in the dopant atoms (column 41, row 61 through column 42, 12).

7. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a first atomic layer doping region for deposition and a second atomic layer doping region for thermal treatment in McInerney et al. in order to diffuse the dopant atoms as taught by Fong et al.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over McInerney et al. and Fong et al. as applied to claims 1-4, 6-8 and 10-17 above, and further in view of U.S. Patent No. 6,056,849 to Straemke.

9. The prior art discloses the invention substantially as claimed and as described above.

10. However, the prior art fails to teach a physical barrier present between adjacent deposition regions.

11. Straemke teaches the use of a closeable, gas tight door (Figure 1, 12) to isolate the deposition area of a treatment chamber and discloses that multiple processing areas can be separated using the doors (column 3, row 50).

12. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided gas tight doors as means of physically separating deposition regions in the prior art in order to provide more effective isolation of adjacent chambers, which results in decreased contamination between the chambers.

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over McInerney et al. and Fong et al. as applied to claims 1-4, 6-8 and 10-17 above, and further in view of U.S. Patent No. 6,207,005 B1 to Henley et al.

14. The prior art discloses the invention substantially as claimed and as described above. Additionally, McInerney et al. teach that there is no limitation as to the specific number of chambers that can be used (column 3, row 26).

15. However, McInerney et al. fail to teach an apparatus comprising a third pair of atomic layer doping regions.

16. Henley et al. disclose a deposition apparatus comprising 3 pairs of deposition regions (Figure 1).

17. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided an additional pair of deposition regions in order to increase the throughput of the deposition apparatus as taught by Henley et al.

18. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,319,553 to McInerney et al. in view of U.S. Patent No. 5,935,334 to Fong et al. further in view of European Patent Application No. 0 060626 to Gattuso et al.

19. McInerney et al. disclose the invention substantially as claimed, including: a multi chamber deposition apparatus (Figure 10) for processes such as atomic layer doping, where simultaneous processing of wafers in separate regions is desired (column 3, row 9). The apparatus comprises a plurality of regions (column 3, row 29; Figure 10, 112, 114, 116, and 118) and a centrally located loading assembly (Figure 3, 104; column 4, row 21) for moving substrates from one region to another. The plurality of regions can be separated into two pairs of regions, so that, in each pair of regions a first region (112 or 116) is capable of applying a first gas species and a second region (114 or 118) is capable of a second processing step (column 5, row 14). All regions are adjacent and chemically isolated form one another by an inert gas curtain of argon (Figure 1, 210; column 8, row 37).

20. Similar to the claimed invention, the loading assembly is capable of moving a plurality of substrates through all four regions sequentially or in a predefined pattern (column 5, row 5). Thus, a plurality of substrates can be treated simultaneously in respective pairs of first and second regions and then transferred to another plurality of regions.

21. However, McInerney et al. fail to teach a first atomic layer region used for deposition and a second atomic layer region used for thermal diffusion of the dopant species.

22. Fong et al. teach deposition of a dopant species in a first processing region and transfer to a second processing region, such as an annealing chamber or a rapid thermal process reactor, for the purpose of driving in the dopant atoms (column 41, row 61 through column 42, 12).

23. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a first atomic layer doping region for deposition and a second atomic layer

doping region for thermal treatment in McInerney et al. in order to diffuse the dopant atoms as taught by Fong et al.

24. The prior art above fails to teach an inert gas curtain provided at a higher pressure than said first dopant species.

25. Gattuso et al. teach the use of an inert gas curtain provided at a pressure somewhat higher than that of the reaction gases within the chamber to create an effective, non-reactive gas curtain (abstract).

26. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided an inert gas curtain at a higher pressure than the reaction gases in the prior art in order to create an effective and non-reactive gas curtain as taught by Gattuso et al.

27. Claim 47 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,319,553 to McInerney et al. in view of U.S. Patent No. 5,935,334 to Fong et al. further in view of U.S. Patent No. 5,382,126 to Hartig et al.

28. McInerney et al. disclose the invention substantially as claimed, including: a multi chamber deposition apparatus (Figure 10) for processes such as atomic layer doping, where simultaneous processing of wafers in separate regions is desired (column 3, row 9). The apparatus comprises a plurality of regions (column 3, row 29; Figure 10, 112, 114, 116, and 118) and a centrally located loading assembly (Figure 3, 104; column 4, row 21) for moving substrates from one region to another. The plurality of regions can be separated into two pairs of regions, so that, in each pair of regions a first region (112 or 116) is capable of applying a first gas species and a second region (114 or 118) is capable of a second processing step (column 5, row 14). All regions are adjacent and chemically isolated form one another by an inert gas curtain of argon (Figure 1, 210; column 8, row 37).

29. Similar to the claimed invention, the loading assembly is capable of moving a plurality of substrates through all four regions sequentially or in a predefined pattern (column 5, row 5). Thus, a plurality of substrates can be treated simultaneously in respective pairs of first and second regions and then transferred to another plurality of regions.

30. However, McInerney et al. fail to teach a first atomic layer region used for deposition and a second atomic layer region used for thermal diffusion of the dopant species.

31. Fong et al. teach deposition of a dopant species in a first processing region and transfer to a second processing region, such as an annealing chamber or a rapid thermal process reactor, for the purpose of driving in the dopant atoms (column 41, row 61 through column 42, 12).

32. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a first atomic layer doping region for deposition and a second atomic layer doping region for thermal treatment in McInerney et al. in order to diffuse the dopant atoms as taught by Fong et al.

33. Additionally, McInerney discloses that each of the gases can be connected to any number of gas supplies so that several different gases can independently controlled to flow through each showerhead (column 5, rows 14-20). This is interpreted as: any of the gas supplying showerheads (specifically those in the second region) are capable of being connected to a non-reactive gas supply source. When combined with Fong et al., as detailed above, one is left with first and second doping regions capable of depositing a doping species in a first region and allowing that species to diffuse with the assistance of a non-reactive gas in a second region.

34. Examiner realizes that the prior art fails to explicitly teach the use of a non-reactive gas in a second region. However, this is seen as an intended use of which the prior art would be capable. The courts have ruled that expressions relating the apparatus to the contents thereof during an intended operation are of no significance in determining the patentability of the apparatus claim. Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969).

35. The prior art discloses the invention substantially as claimed and as described above.

36. However, the prior art fails to teach a separate gas exhaust for each region in a multi-chamber coating apparatus.

37. Hartig et al. teach the use of separate gas exhausts in each chamber for the purpose of aspirating gas from each chamber and further preventing gas transfer between the individual chambers (column 2, rows 17-22).

38. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided separate exhaust mechanisms in each chamber in order to aspirate each chamber and further prevent gas transfer between the individual chambers as taught by Hartig et al.

Response to Arguments

39. Applicant's arguments filed 12/26/02 with respect to claims 1-4, 6-8 and 10-17 and the combination of McInerney et al. and Fong et al. have been fully considered but they are not persuasive. As admitted in the previous office action McInerney fails to teach a first region used for deposition and a second region used for diffusion. Examiner relies on Fong et al. for this teaching. Examiner apologizes for confusion over incorrect citation of the applicable text in Fong et al., which is column 41, row 61 through column 42, row 12. In this passage, Fong et al. teaches that as an alternative to in situ diffusion, a wafer may be transferred to an annealing furnace or a rapid thermal process chamber (preferably within the multichamber system) to drive in dopants. This disclosure is relied upon to complement the disclosure of McInerney in the rejections of claims 1-4, 6-8 and 10-17.

40. With regards to claim 5, in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Straemke is relied upon for its disclosure of a gas tight door for isolating a process. The prior art (McInerney) and the claimed invention are both concerned with isolation of a processing environment. This problem/concern is the motivation for combination of the references used against the present application.

Conclusion

41. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

42. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karla Moore whose telephone number is 703.305.3142. The examiner can normally be reached on Monday-Friday, 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 703.308.1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703.872.9310 for regular communications and 703.872.9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308.0661.

km
February 24, 2003

BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700